A SYNOPSIS OF SOUTH AMERICAN *ECHEANDIA* (ANTHERICACEAE)[1]

Robert William Cruden[2]

ABSTRACT

Eight of the 81 recognized species in *Echeandia* Ortega (Anthericaceae) occur in South America. Four species occur in Venezuela and/or Colombia, one in Ecuador, and three in Peru. The five species in subgenus *Echeandia* are endemic to South America, as is one of the three species in subgenus *Mscavea* Cruden. The other two species in subgenus *Mscavea* occur in both South and Central America. As many as five of the eight species are narrow endemics and four may be quite rare. A comparison of the isotypes of *E. ciliata* (Kunth) Cruden with material from Colombia, Venezuela, and Peru provided evidence that the type gathering was made in Cajamarca, Peru, rather than Caracas, Venezuela, as indicated in Kunth's 1815 protologue. *Echeandia denticulata* Cruden is proposed as a new species to accommodate material from Colombia and Venezuela, which was heretofore included in *E. ciliata*. Two new combinations, *E. herrerae* (Killip) Cruden and *E. weberbaueri* (Poelln.) Cruden, are made, and *Anthericum glareosum* Ravenna (– *E. ciliata*) and *E. aequatoris* Ravenna (– *E. lehmannii* (Baker) Marais & Reilly) are newly synonymized. A neotype for *E. leucantha* Klotzsch and a lectotype for *E. ciliata* are designated. *Anthericum peruvianum* Willd. ex Kunth is an illegitimate name.

Key words: Anthericaceae, Cajamarca, *Echeandia*, endemism, South America.

With 81 recognized species (Cruden, 1999 and references therein; this paper), *Echeandia* Ortega, which occurs from the southwestern United States to southern Peru, is the largest New World genus in the Anthericaceae. Fifty-nine species occur in Mexico, and the distributional ranges of three of those species extend into Central America and two into the southwestern United States. Thirteen species are endemic to Central America, and two species occur in Central America and northwestern South American. Six species are endemic to South America, and one species is known only from the United States.

As presently construed, *Echeandia* includes many of the New World species originally placed in *Anthericum* L. (Cruden & McVaugh, 1989; Cruden, 1994, 1999). Previous workers separated the New World taxa on the basis of connate (*Echeandia*) versus free anthers (*Anthericum*) (e.g., Baker, 1876; Greenman, 1898; Weatherby, 1910; Hutchinson, 1959; Ravenna, 1988). The incorporation of New World species with free anthers into *Echeandia* was based on unique traits that they shared, e.g., scaled (i.e., squamate) filaments and polycarpic rhizomes. All but two or three of the species in *Echeandia* can be placed easily in one of two subgenera based on morphological and physiological traits (Cruden, 1999). In both subgenera, some species have free anthers while others have connate anthers. For example, in subgenus *Echeandia*, *E. ciliata* (Kunth) Cruden has free anthers and *E. lehmannii* (Baker) Marais & Reilly has connate anthers; in subgenus *Mscavea* Cruden, *E. bolivarensis* Cruden has free anthers and *E. leucantha* Klotzsch has connate anthers. In essence, the use of this key character confused rather than clarified

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[2] Department of Biology, University of Iowa, Iowa City, Iowa 52242, U.S.A. robert-cruden@uiowa.edu.

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relationships within *Echeandia* and between *Echeandia* and related genera. The latter include the South American genera *Diamena* Ravenna, *Diora* Ravenna, *Hagenbachia* Nees & Mart., and an unpublished genus (Cruden, in prep.), as well as the Old World genera *Anthericum* and *Chlorophytum* Ker Gawl.

Echeandia and its New World relatives are separated by both floral and vegetative traits. Three floral traits (yellow flowers, connate anthers, and/or scaled filaments) distinguish all but four species of *Echeandia* from their South American relatives (Cruden, 1999; see also Ravenna, 1987; Conran, 1998). The four exceptions have white flowers, free anthers, and smooth, terete filaments (Cruden, 1999). All *Echeandia* have a perennial, unsegmented, erect rhizome that gives rise to new roots, a basal rosette of leaves, and a flowering scape each year. Also, their flowers lack nectaries. In contrast, flowers of the related genera in South America are almost always white, very rarely yellowish or possibly bluish white, have free anthers, and have scaleless filaments. The rhizomes of these genera are segmented and the terminal segment produces a set of roots that appears to function through two, three, or more subsequent flowering episodes, basal leaves, and a flowering scape. The flowers of *Diora*, *Diamena*, and the unpublished genus have septal nectaries (Cruden, pers. obs.; Ravenna, 1987, 1988). In addition, *Diora* is distinguished by red pollen and scabrescent capsules, and produces flowering scapes and basal leaves at different times of the year; *Diamena* has long, tubular corollas (Ravenna, 1987); *Hagenbachia* has small flowers, few ovules, small, globose capsules, and roots with no storage areas (Cruden, 1987); and the filaments of the unpublished genus are expanded above the middle (Cruden, pers. obs.).

Floral Traits and Pollination Relationships

There are substantial differences in floral traits among the South American species that reflect adaptation to different pollinators, different pollinator behaviors, and/or pollination environments. The flowers of *Echeandia lehmannii*, *E. leucantha*, and *E. pittieri* Cruden are nutant, and their anthers taper apically and are united laterally, thus forming a narrow cone that is open at its apex. The cone is vibrated by bees to extract the pollen (Bernhardt & Montalvo, 1979; Conran, 1998; Cruden, pers. obs.). The anthers of *E. bolivarensis* are nonversatile and shed pollen through apical openings that result from the spreading of the anther walls at the top of the line of dehiscence (Cruden, pers. obs.). Each filament is inserted in a deep pit, which holds the anther on the same axis as the filament. Such anthers in Mexican species, either singly or together, are vibrated by bees to obtain the pollen (Cruden, pers. obs.). The stamens of *E. bolivarensis* are similar to those of *E. campechiana* Cruden, and flowers of the latter are nutant. Likewise, the anthers of *E. weberbaueri* (Poelln.) Cruden are nonversatile, but are held in line with the axes of the filaments by the strongly reflexed walls of the anther sacs and dehiscence is lateral. The flowers of *E. ciliata* and *E. weberbaueri* have straight to somewhat arcuate or declinate styles that extend (2–)3–6 mm beyond the anthers and usually turn upward just below the stigmas. This characterizes flowers that are cernuous or patent. The styles of *E. denticulata* Cruden are deflexed and usually bend forward below and parallel to the anthers, and the stigmas are exserted below and (1–)2–4(–5) mm in front of the anthers. The flowers are probably patent, possibly cernuous, as are the flowers of Mexican species with similar styles (Cruden & McVaugh, 1989: 194, 195). In contrast, the flowers of *E. herrerae* (Killip) Cruden appear to be erect or nearly so, and their geniculate styles pass between the filaments. The stigmas are exserted up to 2(–2.5) mm lateral to the stamens or, occasionally, the styles are straight and the stigmas are surrounded by or barely exceed the anthers. A similar relationship between stamens and styles occurs in *Nemastylis* Nutt. (Iridaceae) and *Xyris juncea* R. Br. (Xyridaceae). Erect flowers are frequently associated with plants with short inflorescences that live in open and/or exposed sites. Finally, the failure of most flowers on most plants to produce capsules suggests the flowers of all the species are cross-pollinated and the plants outbred.

Endemism

Five of the eight South American *Echeandia* (Appendix 1) are known from two to four collections and/or have limited distributional ranges and three, *E. denticulata*, *E. herrerae*, and *E. leucantha*, are widespread and relatively common (Fig. 1). *Echeandia ciliata* is endemic to southern Cajamarca, Peru, which is within the Amotape–Huancabamba zone, a region noted for its endemic species (e.g., Berry, 1982; Hensold, 1999; Sagástegui et al., 1999; Weigend, 2002). This species has been collected from ca. 15 km southwest of Cajamarca, i.e., ca. Cumbe Mayo, to 43 km east of the city and from a little southwest of Bambamarca southeast to Cajabamba, a distance of ca. 120 km (Fig. 1). The three collections of *E. lehmannii* with reasonable collection data were made 20–30 km north and northeast of Quito (Ecuador) at sites ca. 30 km apart. These sites are within or close to the Pululahua Crater and the

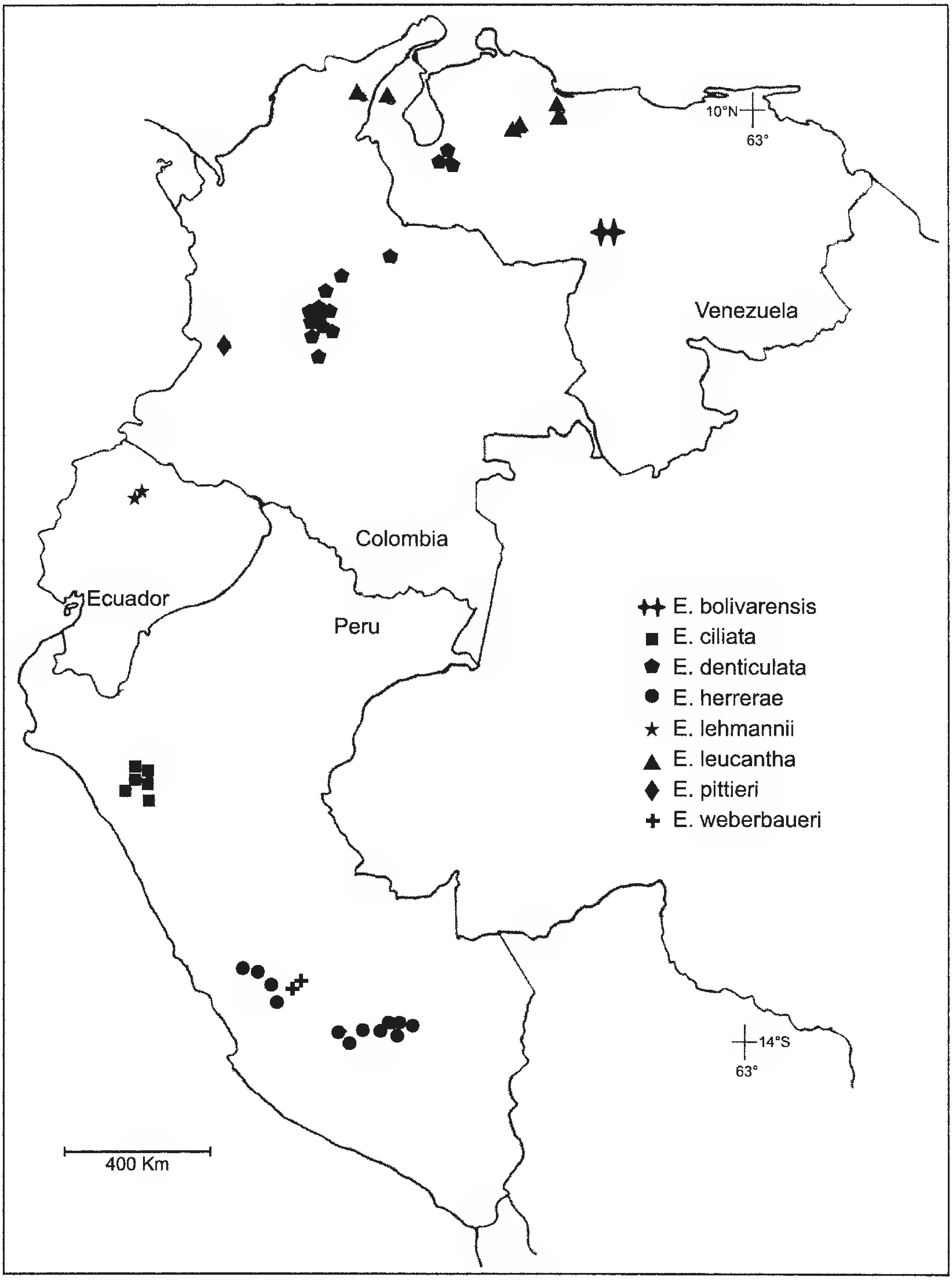

Figure 1. Distributional ranges of the South American species of *Echeandia*.

nearby Volcán Mojanda–Fuya Fuya. The absence of specimens from Volcán Pichincha and similar, nearby sites suggests this species has a restricted range. The two collections of *E. bolivarensis*, which is endemic to Venezuela, were made within a few kilometers of each other on the Serranía de Los Pijiguaos near Los Pijiguaos in the western part of the state of Bolívar. The proximity of the two localities suggests a limited distributional range, but the collections probably reflect, at least in part, the development of a bauxite mine on the serranía, which provided easy access to the area. *Echeandia bolivarensis* might well be found elsewhere in the region. Likewise, *E. weberbaueri* may be more widely distributed than the two collections from Peru suggest. These were made 5–10 km apart in or close to the valley of the Río Mantaro ca. 60 km east of Huancayo. *Echeandia pittieri* is known from a single locality in Colombia (Fig. 1) and two in Panama (Cruden, 1986b). This suggests a rare species with a relatively large distributional range.

Taxonomic Treatment

I. Echeandia Ortega, Nov. Pl. Descr. Dec., 135, t. 18. 1800. TYPE: *Echeandia reflexa* (Cav.) Rose, Contr. U.S. Natl. Herb. 10: 93. 1906 [= *Anthericum reflexum* Cav.].

Perennial herbs from short, erect, unsegmented polycarpic rhizomes associated with annual roots with distinct and obvious storage areas, these usually enlarged either close to the rhizome or at some distance; the roots, including the storage areas, usually covered with root hairs. Basal leaves bifacial, very narrowly linear, oblong to elliptic, the bases usually surrounded by a fibrous collar composed of previous years' leaf bases. Scapes bear 0 to 4 (sometimes more) cauline leaves below the lowest branch or flower-bearing node, these reduced in size acropetally and subtend the branches and flower-bearing nodes. Inflorescences racemose or paniculate with (1 or)2 to 4(or 5) flowers at a node, each flower subtended by a bracteole. Flowers yellow to yellow-orange, or white, very rarely pale yellow or cream, ± erect, cernuous to patent, or nutant; tepals and stamens originate independently on the receptacle; tepals narrowly to broadly elliptic, reflexed to spreading, 3-, rarely 5-veined, these loosely enclose developing capsules and wither prior to dehiscence; filaments free, ± cylindrical to clavate, smooth, wrinkled and scaleless, or bearing transverse scales, insertion in a shallow pit (anthers versatile), deep pit or pocket (anthers nonversatile), or in a deep pocket (anthers connate); anthers yellow, dorsifixed near the base, rarely basifixed, free or connate laterally, if free ± versatile and dehiscing laterally or nonversatile and either dehiscing apically through apical slits or dehiscing laterally, if connate the anthers forming the frustrum of a cone (hereafter cone) whose shape varies from ± cylindrical or barrel-shaped (anthers parallel-sided) with a broadly lobed apex to narrowly conical (anthers tapered from base to apex) with a minutely lobed apex; ovary oblong, superior; ovules 8 or more per carpel. Fruit a loculicidal capsule, broadly to narrowly oblong, rarely ± globose, shallowly 3-lobed; seeds irregularly compressed and folded; seed coat black, colliculose. Chromosome numbers $2n = 16, 32, 48, 64, 80$, ca. 84 (see Cruden, 1994, 1999).

Key to the South American Species of *Echeandia*

The key was constructed using the specimens listed in Appendix 2, and most of the species were represented by fewer than 10 collections. If those specimens were a biased sample of the variation in a species, the key may not work. Also, because of the considerable overlap of variation in both floral and vegetative traits among species, a few specimens may not key out. However, because most of the species are allopatric, most specimens can be identified using geography (Fig. 1). The key includes the species in both subgenera.

1a. Anthers joined laterally, forming a cone; flowers mostly nutant.
  2a. Flowers yellow; basal leaves 8–20 cm long; scape 19–32(–40) cm high; 2800–2850 m, Ecuador . . . . 4. *E. lehmannii*
  2b. Flowers white; most basal leaves 27–83 cm long; scape (40–)65–115 cm high; 190–1500 m, Colombia and Venezuela.
    3a. Filaments with transverse scales; storage roots enlarged 3–6 cm from the rhizome; northern Colombia and northwestern Venezuela . . . . 7. *E. leucantha*
    3b. Filaments smooth; storage roots enlarged 1–2 cm from the rhizome; western Colombia . . . . 8. *E. pittieri*
1b. Anthers free; flowers erect, cernuous, patent, or possibly nutant.
  4a. Scape 98–118 cm high; cauline leaves 4 or 5, the lowest 10–19 cm long; storage areas of roots enlarged (1–)3–6 cm from the rhizome, most 3–5 cm long; below 700 m, Venezuela . . . . 6. *E. bolivarensis*
  4b. Scape to 70 cm high, rarely higher; cauline leaves 0 to 2, rarely 3, lowest 0.6–3.5(–5.1) cm long; storage areas of roots enlarged 1–2 cm from the rhizome, 1–3 cm long, rarely longer; above 1000 m, Venezuela, Colombia, Peru.
    5a. Flowers erect; styles 2–6(–6.5) mm long, geniculate, occasionally straight and the stigmas equal to or barely exceeding the anthers; pedicels of flowers 2.5–6(–7) mm long; 2800–3824 m, Peru, Junín south to Apurimac and Cuzco . . . . 3. *E. herrerae*
    5b. Flowers patent to cernuous; styles (5.5–)6–11 mm long, straight to somewhat deflexed, exserted 2–6 mm beyond the anthers; pedicels of flowers (4–)5–15 mm long.

6a. Filaments bearing transverse scales and margins of the basal leaves entire to denticulate, occasionally short-ciliate or rarely ciliate; (1300–)2300–3500 m, Colombia and Venezuela . . . . . . 2. *E. denticulata*
6b. Filaments smooth, wrinkled and scaleless, or occasionally bearing small, narrow, transverse scales; margins of the basal leaves short-ciliate to long-ciliate, rarely denticulate; Peru.
  7a. Tepals usually twice or more than twice the length of the stamens; anthers 1.5–2.5 mm long, becoming twisted or strongly curved during or after anthesis; capsules 10–12 mm long; most basal leaves 2–7 mm wide, usually falcate; 2500–3400 m, Cajamarca . . . . 1. *E. ciliata*
  7b. Tepals usually less than twice the length of the stamens; anthers (2–)2.5–4 mm long, most remaining straight after anthesis; capsules 12–13.5 mm long; most basal leaves 6–12 mm wide, frequently flat; 2300–2700 m, Huancavelica . . . . 5. *E. weberbaueri*

The Subgenera

The two subgenera of *Echeandia*, both of which are represented in South America, are distinguished by the shape of their inner tepals, time of flower opening, and whether the flowers are primarily yellow or white and the anthers free or connate. The South American species are morphologically similar to their Mexican and Central American relatives, upon which this discussion is predicated (see Cruden, 1999). Species in subgenus *Echeandia* have elliptical to broadly elliptical inner tepals that are usually equal to or greater than 4.5 mm wide. Forty of the 55 species have yellow to orange flowers, 10 have white flowers, and five species have populations that are either yellow-flowered or white-flowered. Approximately two thirds of the species in subgenus *Echeandia* have free anthers, and the anthers of the remainder are connate laterally. In most of the species with free anthers, the anthers dehisce laterally. In contrast, 24 of 26 species in subgenus *Mscavea* have narrowly elliptical tepals (maximum width, 4.5 mm), and 21 of the 26 species have white flowers, two have cream-colored flowers, two have orange flowers, and one has populations with either white or orange flowers. Twenty-one of the 26 species have connate anthers and the other five have free anthers that dehisce apically. Further, based on the observation of ca. 50 Mexican and Guatemalan species in the field and/or greenhouse, the flowers of species in subgenus *Echeandia* open early in the morning and close by mid- or late afternoon whereas those in subgenus *Mscavea* open from late in the morning to early afternoon and close in late afternoon or early evening. Also, species in subgenus *Echeandia* tend to occur at higher elevations in relatively mesic habitats with warm- to cold-temperate climates compared to species in subgenus *Mscavea*. The latter occur at lower elevations in drier habitats with subtropical to warm-temperate climates. With the exception of a few decaploid ($2n = 80$ chromosomes) species in subgenus *Echeandia*, equivalent chromosome numbers occur in the two subgenera (Cruden, 1994, 1999). In both subgenera, diploid species predominate in Mexico north of the Isthmus of Tehuantepec and polyploid species are more common to the south of the isthmus, i.e., in Central America (Cruden, 1994). No documented chromosome numbers are known for the South American species. Finally, illustrations and/or photographs of species in the two subgenera are found in Bernhardt and Montalvo (1979: 68), Cruden and McVaugh (1989: 187, 194, 195), and Conran (1999: 116).

The five South American species in subgenus *Echeandia* are similar to their Mexican and Central American relatives, but they exhibit a relatively small subset of the variation exhibited by their northern relatives (Cruden & McVaugh, 1989; Cruden, 1994). Those five species, all of which are endemic to South America, have yellow flowers with elliptical to broadly elliptical inner tepals, four have free anthers, and all occur above 2000 m (but see *E. denticulata*). The storage areas of the roots develop 0.5–2 cm from the rhizome, the scapes are mostly 15–50 cm high, and the main axes of the inflorescences support six to 15 flower-bearing nodes. If the filaments bear transverse scales, they are quite narrow to relatively narrow.

I suggest the species in subgenus *Echeandia* might have had a common ancestor because they are similar morphologically and the traits that distinguish them are primarily qualitative. The latter include the relative numbers of plants with dentate versus ciliate leaf margins, scaled versus scaleless filaments, the length of the stamens vis-à-vis the length of the tepals, and/or glabrous versus scabrescent scapes. The unique traits that distinguish *E. herrerae*, e.g., its shorter stature, erect flowers, and geniculate styles, may reflect its growing in open, exposed habitats. The major difference between *E. lehmannii* and the other South American species are its connate anthers. In essence, it appears that the extant species have somewhat different combinations of traits that might have characterized a common ancestor. Finally, the South American species are similar to *E. skinneri*, the only Central American species with free anthers that is found south of Guatemala. There is no Central American species that is an obvious progenitor of *E. lehmannii*.

Only one of the three species in subgenus *Mscavea*, *Echeandia bolivarensis*, is endemic to South America, and it is just one of three species in the subgenus with yellow flowers. One of these, *E. campechiana*, which is endemic to the Yucatán Peninsula in Mexico, is also a robust species with tall scapes (0.9–1.5 m high), numerous branches, and smaller flowers (tepals 8–11 mm long) with anthers that dehisce apically (Cruden, 1994). The other two species in subgenus *Mscavea* have white flowers with narrowly elliptical inner tepals and connate anthers. These species, *E. leucantha* and *E. pittieri*, occur in both northwestern South American and Central America below 1500 m.

Ia. Echeandia subgen. Echeandia

Flowers yellow, occasionally white; inner tepals elliptic to broadly elliptic; flowers opening in early morning and closing in early to mid-afternoon (Cruden, 1999).

1. **Echeandia ciliata** (Kunth) Cruden, Phytologia 59: 380. 1986. Basionym: *Phalangium ciliatum* Kunth, Nov. Gen. Sp. [HBK] (quarto ed.) 1: 276, t. 676. 1815 [1816]. *Anthericum ciliatum* (Kunth) Spreng., Syst. Veg. 2: 84. 1825, nom. illeg., non *Anthericum ciliatum* L. f., 1781, nec *Anthericum ciliatum* (Kunth) Schult. & Schult. f., Syst. Veg. 7(1): 466. 1829. *Anthericum humboldtii* Hemsl., Biol. Cent.-Amer., Bot. 3: 374. 1884, replacement name for *A. ciliatum* (Kunth) Schult. & Schult. f. *Anthericum sprengelii* Rusby, Mem. Torrey Bot. Club 6: 127. 1896, nom. illeg., replacement name for *A. ciliatum* (Kunth) Spreng., pro syn. *A. humboldtii*. TYPE: [Peru.] "Crescit prope Caracas, alt. 470 hex., Floret Januario," *F. W. H. A. Humboldt & A. J. A. Bonpland s.n.* (lectotype, designated here, P-Bonpl. not seen, photo!; isotypes, P!, B-W 6657/1 not seen, photo!).

Anthericum glareosum Ravenna, Onira 1: 29. 1988. Syn. nov. TYPE: Peru. Cajamarca: Cajamarca, El Cumbé, 2800 m, 17 Apr. 1958, *A. López 1307* (holotype, Hb. Ravennae not seen; isotypes, HUT 2622 not seen, K not seen, US!).

Anthericum peruvianum Willd. ex Kunth, Index Kew. 1: 146. 1895, nom. illeg. Based on *Anthericum peruvianum* Kunth, Enum. Pl. 4: 596, 1843, nom. nud. (see nomenclature).

Storage areas of roots enlarged 0.5–1 cm from the rhizome, 1–2(–2.5) cm long. Basal leaves 5 to 10(to 14), 6–15(–19) cm × (1–)2–7(–9) mm, falcate, rarely flat, ciliate to long-ciliate, occasionally short-ciliate to ciliate, rarely densely so; cauline leaves 0 or 1(or 2), if present, the lowest 8–21 mm. Scape 1, (8–)21–50 cm high, rarely a few centimeters higher, height (1.2–) 2.5–4 times the length of the longest basal leaf, glabrous or nearly so to minutely scabrescent toward the base, branches 0 or 1(or 2); main axis of inflorescence with 6 to 16 flower-bearing nodes, lowest 1- or 2-flowered, upper 1-flowered; flowers yellow, most cernuous to patent; pedicels (4–)5–9 mm; tepals (12–)13–16.5(–18.5) mm, usually twice or more than twice the length of the stamens, probably spreading to somewhat reflexed, inner tepals 6 mm or more wide; filaments 5–7 mm, ± straight, smooth or wrinkled and scaleless, occasionally bearing a few tiny, quite narrow to numerous small, narrowly transverse scales, inserted in a shallow pit; anthers free, versatile, 1.5–2.5(–3.5) mm, or longer if not curled and/or twisted, dehiscence lateral; ovary 2–3 (–3.5) mm; styles 6–10 mm, straight to gently arcuate, turned upward below the stigma; the stigma exserted (2–)3–6 mm beyond the anthers. Capsules oblong, 10–12 × 4.5–5 mm.

Distribution and habitat. This slender-stemmed species is endemic to southern Cajamarca, Peru, between 2500 and 3400 m elevation, from south of Bambamarca southeast to near Cajabamba and from 15 km southwest of Cajamarca (Cumbe Mayo) to ca. 43 km east of Cajamarca (Fig. 1). It is usually a plant of dry and/or rocky places, including over-grazed hillsides where it grows among shrubs and other herbs. It was also found in disturbed roadsides and edges of cultivated fields.

Phenology. In flower January to May.

Discussion. A combination of floral and vegetative traits distinguishes *Echeandia ciliata* and separates it from other South American species in subgenus *Echeandia*. It is distinguished by the narrow, falcate, basal leaves whose margins are ciliate, slender scapes ([8–]21–50 cm high [rarely a few centimeters higher]) that are frequently three to four times the length of the longest basal leaf, relatively large flowers (tepals [12–] 13–16.5[–18.5] mm long), and tepals that are usually twice or more than twice as long as the stamens.

Echeandia ciliata is most likely to be confused with *E. denticulata*. The filaments of most specimens of *E. ciliata* were scaleless and the leaf margins ciliate, whereas the filaments of all the specimens of *E. denticulata* were scaled and most (39 of 49 specimens) had entire to denticulate leaf margins. However, occasional specimens of both *E. ciliata* (e.g., *Dillon et al. 2862* and *Sagástegui 15148*) and *E. denticulata* may have scaled filaments and ciliate leaf margins. In addition, the capsules of *E. ciliata* were smaller than those of *E. denticulata* (10–12 mm vs. [9–]11–17 mm long).

Most specimens of *Echeandia ciliata* were easily distinguished from those of *E. herrerae* and *E. weberbaueri*. In general, the tepals of *E. ciliata* were twice or more than twice the length of the stamens, whereas those of *E. herrerae* and *E. weberbaueri* were usually less than twice the length of their stamens. Further, the flowers of *E. herrerae* were generally smaller (tepals 9–13[–15] mm vs. [12–]13–16.5 [–18.5] mm long) with shorter pedicels (2.5–6[–7] mm vs. [4–]5–9 mm long), shorter geniculate styles (2–6[–6.5] mm vs. 6–10 mm long), and generally shorter (4–26[–ca. 45] cm vs. [8–]21–50 cm high, rarely a few centimeters higher) and noticeably scabrescent to scabrous scapes that were usually less than twice the length of the longest basal leaf. The scapes of *E. ciliata* were usually three to four times the length of the longest basal leaf and smooth to minutely scabrescent toward the base. Compared to plants of *E. weberbaueri*, those of *E. ciliata* had somewhat shorter scapes ([8–]21–50 cm vs. 34–59 [–68] cm high), falcate basal leaves that were shorter (6–15[–19] cm vs. [6.5–]10–25[–33] cm) and narrower ([1–]2–7[–9] mm vs. [3–]6–12 mm), and, if present, shorter cauline leaves (8–21 mm vs. 16–35[–49] mm long). Also, the anthers of most specimens of *E. weberbaueri* were longer ([2–]2.5–4 mm vs. 1.5–2.5 mm), usually nonversatile, and remained straight to somewhat curved during and after dehiscence, whereas those of *E. ciliata* were versatile and twisted during or after dehiscence. Finally, *E. ciliata* is geographically disjunct from both *E. herrerae* and *E. weberbaueri* (Fig. 1). The former occurs on the Pacific slopes of the Andes in southern Cajamarca, and the latter two occur 500 km or more to the south on the Atlantic slopes of the Andes from Junín south to Apurimac and Cuzco.

Nomenclature. Here I compare the type gathering of *Phalangium ciliatum* (= *Echeandia ciliata*) (*Humboldt & Bonpland s.n.*) with specimens from Venezuela, Colombia, and Peru and show that the epithet *ciliata* should be applied to plants from Peru. The sheet bearing the lectotype of *Phalangium ciliatum* bears two labels, both in the lower left-hand corner. One is a printed label: "HERB. MUS. PARIS, Herbier Humboldt & Bonpland. AMÉRIQUE ÉQUATORIALE," and the second bears an annotation by Kunth (L. Constance, pers. comm.; W. Greuter, pers. comm.): "I," "Phalangium ciliatum." The sheet bears a complete specimen on the right, which is the lectotype, and parts of a second on the left. I designated the complete specimen as the lectotype because it is nearly identical to the illustration (tab. 676) that accompanied Kunth's protologue and undoubtedly served as the model for the illustration.

The isotypes bear Bonpland's collection labels, which are virtually identical. The sheet at P bears two specimens, the scape of a third, and three labels. The label in the lower left-hand corner was annotated by Bonpland (M. Cusset, pers. comm.; also see Rankin Rodríguez & Greuter, 2001: fig. 5): "VII. Ornithogalum?" in the upper left corner and "Perou" in the lower right corner. The label in the lower right-hand corner of the sheet has printed above: "HERB. MUS. PARIS" followed by an annotation (possibly by an older Kunth [W. Greuter, pers. comm.]): "*Phalangium ciliatum* HBK. N. Gen. I. 276."; in a second hand: "*Anthericum* R. Sch."; below that, possibly by Kunth (W. Greuter, pers. comm.): "Caracas," and printed across the bottom "Herbier de l'Amérique équatoriale, donné par M. A. Bonpland." The second hand might well be that of Richard Schomburgk. A printed label "isotype" is affixed over the upper right-hand corner of the second label.

The isotype described immediately above includes two flowers. The single filament that can be observed in one flower is smooth. The flower in the pocket has five filaments that are relatively smooth, and the sixth bears a few tiny, narrow scales. The scales were barely discernible with a 10× hand lens in good, artificial light, and thus might have appeared as glabrous to Kunth. The tepals are more than twice the length of the stamens. Finally, the leaf margins of one plant are mostly short-ciliate to ciliate, and those of the second are irregularly denticulate to short-ciliate with occasional longer enations. The scapes are minutely and sparsely scabrescent toward the base. With the exception of the leaf margins of one specimen, these traits are consistent with the description of *Phalangium ciliatum* (Kunth in Humboldt et al., 1815).

The sheet at B-W bears two plants, one intact with roots and the other a scape and detached leaves. Both the sheet and a label were annotated by Schlechtendal and it bears Bonpland's collection label. The sheet is annotated "Anth. peruvianum 1." in the upper right-hand corner and "Humboldt. W." in the lower right-hand corner (both by Schlechtendal; cf. Rankin Rodríguez & Greuter, 2001: fig. 3). The latter indicates that Humboldt donated the specimen and that it was deposited in the Willdenow herbarium (W. Greuter, pers. comm.). Bonpland's collection label (lower left) is virtually identical to the label on the isotype at P: upper left; "VII. Ornithogalum?"; lower left; "(Humboldt)"; and lower right; "Perou." The "(Humboldt)" was added by Schlechtendal (W. Greuter, pers. comm.; cf. Rankin Rodríguez & Greuter, 2001), another indication that Humboldt was the source of the specimen (L. Constance, pers. comm.; W. Greuter, pers. comm.; also see McVaugh, 1955). The general aspect of the specimen (see photographs: types of the Berlin Herbarium at F, GH) is remarkably similar to the isotype (P) as are the flowers. Two of the filaments have noticeable transverse scales, which the others lack. The leaf margins are ciliate with most enations 0.10–0.25 mm long, and the scapes are minutely scabrescent toward the base (C. Oberprieler, pers. comm.).

The plants on the sheet at B-W and the two at Paris surely constitute a single gathering. First, the specimens are similar morphologically. Second, the isotypes are linked by Bonpland's collection labels and Schlechtendal's annotations indicating that the sheet at Berlin came from Humboldt. Third, the annotation "Caracas" on the isotype (P) links it with the protologue, hence the lectotype. There being a single gathering would explain why Schultes and Schultes f. (1829: 466), based on information from the younger Schlechtendal, included *Anthericum peruvianum* as a synonym of *A. ciliatum* and Kunth (1843: 596), who had firsthand knowledge of the specimens, included it as a synonym of *Phalangium ciliatum*.

The combination *Anthericum peruvianum* Willd. ex Kunth has no standing as it was not legitimately described. Jackson (1895: 147) attributed the name to Kunth, whose name was illegitimate. In his treatment of *Phalangium ciliatum*, Kunth identified the isotype at B-W as "*Anthericum peruvianum* Willd. herb. no. 6657" and included this brief passage as a synonym of *P. ciliatum*. In essence, Kunth identified the herbarium sheet as being the same as the plants included in *P. ciliatum*. The combination is not legitimately described because the name was included as a synonym of *A. ciliatum* (McNeill et al., 2006: Art. 34.1.c) and no description was provided. Earlier, Schultes and Schultes f. (1829: 466) in their treatment of *A. ciliatum*, immediately following their reference to Kunth's *P. ciliatum*, provided a diagnosis of *A. peruvianum* and cited Willdenow's notes: "Anthericum peruvianum, fol. lin.,. . . scapo simplici. Reliqu. Willd. Ms. (fide de Schlectend. fil.)." Although a type specimen was not designated, it is clear that the name was associated with the isotype at B-W. Even so, this combination was not legitimately described as it was included as a synonym of *A. cililatum*.

The holotype of *Anthericum glareosum* was unavailable for examination, and, as of April 2009, K had not received the isotype (P. Wilkin, pers. comm.). The presence of the isotype at HUT was confirmed by E. F. Rodríguez.

Provenance of Echeandia ciliata. For nearly 200 years, systematists used Kunth's *Phalangium ciliatum* to describe plants collected in Colombia or Venezuela (included here in *Echeandia denticulata*) as well as elsewhere in South America (e.g., Hauman, 1917; Guaglianone, 1996). The former is surely due to Kunth's observation in the protologue "Crescit prope Caracas,. . . ," which was repeated by subsequent workers (e.g., Baker, 1876; Cruden, 1986a). However, based on the material I examined, this and other information in Kunth's protologue are not supported by the available data. First, *Echeandia* is unknown from the region around Caracas, and the nearest populations of *E. denticulata* are in the Cordillera de Mérida, 300–400 km to the southwest of Caracas, an area that Humboldt and Bonpland did not visit (Sandwith, 1925; Stearn, 1968; Núñez & Petersen, 1970). Second, no population of either *E. ciliata* or *E. denticulata* has been found as low as 470 hexameters (ca. 916 m). Third, the isotypes bear Bonpland's collection labels (W. Greuter, pers. comm.), indicating they were collected in Peru. Fourth, Kunth (in Humboldt et al., 1815) described the flowers as white, but yellow is the only flower color reported for subsequent collections of South American species in subgenus *Echeandia*. These contradictory observations may reflect the absence of field notes concerning these specimens. Neither the lectotype nor isotypes bear a number that would associate them with an entry in Humboldt and Bonpland's field notes (W. Greuter, pers. comm.), thus the source of the information on location, its elevation, time of collection, and flower color is unknown. The absence of field notes undoubtedly accounts for McVaugh's observation that Kunth included inaccurate collection data in his protologues with some frequency (R. McVaugh, pers. comm.). In contrast, Bonpland's collection labels were probably reliable (W. Greuter, pers. comm.). Below, I briefly discuss flower color, examine Humboldt and Bonpland's itinerary, and compare a number of traits to establish a possible origin for the Humboldt and Bonpland gathering.

Given the absence of field notes and no indication of flower color on Bonpland's field labels, one can only speculate as to why Kunth (in Humboldt et al., 1815) described the flowers as white, whereas all the other specimens of *Echeandia ciliata* I examined were yellow-flowered. Further, the only flower color reported for the other South American species in subgenus *Echeandia* was yellow (33 collections representing four species). Today, the original color of the flowers on the isotype at P is problematic; thus, it is possible the flowers examined by Kunth had faded from yellow to appearing off-white. It is also possible that Humboldt and Bonpland encountered a rare, white-flowered population. The former seems the more likely explanation.

An examination of Humboldt and Bonpland's itinerary (Humboldt et al., 1825; Sandwith, 1926; Sprague, 1926; Stearn, 1968; Núñez & Petersen, 1970) shows that they could have encountered only *Echeandia denticulata* and/or *E. ciliata*. They could not have encountered *E. herrerae* or *E. weberbaueri* because they did not visit the east side of the Andes where those species occur. Humboldt and Bonpland were in or near Bogotá, Colombia, between June and September of 1801 (Sprague, 1926), when *E. den-*

ticulata is typically in flower (see below), and visited localities where *E. denticulata* was subsequently collected, i.e., Suba and Cota. They were in the vicinity of Cajamarca in northwestern Peru in mid-September 1802 (Sandwith, 1926; Stearn, 1968; Núñez & Petersen, 1970) and visited or were close to a number of sites where *E. ciliata* was subsequently collected, e.g., between Hualgayoc and Cajamarca (north of Cajamarca), Baños del Inca (east of Cajamarca) and Cumbe Mayo, and other sites between Cajamarca and Magdalena to the southwest of Cajamarca (cf. Humboldt and Bonpland's itinerary [Humboldt et al., 1825; Sandwith, 1926; Stearn, 1968] with specimens listed below).

A comparison of two traits establishes Cajamarca as the most likely source of the type gathering of *Phalangium ciliatum* rather than Colombia. First, Kunth (in Humboldt et al., 1815) described the filaments of *P. ciliatum* as glabrous, as were most of the filaments of the two isotypes and most of the specimens I examined from Cajamarca. Of the latter, the filaments of flowers from six populations (12 plants) were either smooth (nine specimens) or wrinkled and scaleless (three specimens). The filaments of flowers from two populations (six plants) bore tiny to small, quite narrow to narrow, transverse scales. These populations were to the east (*Dillon et al. 2863*) and southeast of Cajamarca (*Sagástegui 15148*), areas not visited by Humboldt and Bonpland. In contrast, the upper half of the filaments of all the specimens with visible filaments that I examined from Colombia and Venezuela (22 plants from nine populations) bore numerous, transverse scales, which, in general, were easily observed with a 10× hand lens in natural light.

Second, the leaf margins of most of the plants from Peru were ciliate and most of those from Colombia and Venezuela were denticulate. Kunth described the leaf margins of *Phalangium ciliatum* as ciliate (Kunth in Humboldt et al., 1815). The leaf margins of three of the four plants that constitute the isotypes were short-ciliate to ciliate (most enations 0.1–0.25 mm long). The margins of the fourth plant (at P) were a mixture of tiny teeth and tiny, short cilia, with occasional longer enations. The leaf margins of the specimens that I examined from Cajamarca were either short-ciliate to ciliate (23 of 26 specimens) or ciliate to long-ciliate (three of 26 specimens). In contrast, the leaf margins of most of the plants I examined from Colombia and Venezuela were entire to denticulate (39 of 49 plants) (enations to 0.14 mm long) and occasionally denticulate/short-ciliate (seven plants) or short-ciliate (three plants).

Based on these comparisons, it seems reasonable to conclude that the type gathering was made in Cajamarca rather than Colombia. The specimens I examined from Cajamarca had ciliate leaf margins and the filaments were either scaleless or bore narrow to quite narrow, transverse scales, whereas the flowers of the plants in the Humboldt and Bonpland gathering had a mix of filaments that were either smooth or bore quite narrow, transverse scales as well as having ciliate leaf margins. In contrast, the plants from Colombia had noticeably scaled filaments and most had entire to denticulate leaf margins.

Also, plants from Colombia and Venezuela were more likely to have smooth scapes, whereas those from Peru were more likely to be weakly scabrescent toward the base to scabrous in the lower half, which is consistent with the type gathering being made in Peru. Kunth (in Humboldt et al., 1815) described the scapes of *Phalangium ciliatum* as smooth apically and minutely scabrescent toward the base. This was true of the isotypes and 14 of 24 specimens from Cajamarca (the others being smooth or nearly so). In contrast, 56 of the 63 specimens from Colombia and Venezuela had smooth scapes, and the scapes of the other seven were weakly scabrescent toward the base.

The only information that is inconsistent with Cajamarca being the location of the Humboldt and Bonpland gathering is the flowering period of *Echeandia ciliata*. Based on the nine gatherings I examined, *E. ciliata* flowers from late December to late May, whereas Humboldt and Bonpland were in Cajamarca in September. Thus, it might seem unlikely that Humboldt and Bonpland found *E. ciliata* in flower. However, flowering at atypical times occurs in other species, e.g., *E. leucantha* (see below; see also Hofreiter & Rodríguez, 2005). Such occurrences may be relatively common in tropical regions with seasonal dry forests where flowering may be triggered by rainfall rather than photoperiod (e.g., Augspurger, 1981; see also Janzen, 1966; Rathcke & Lacey, 1985).

The available evidence supports two conclusions: (1) the Humboldt and Bonpland gathering included the lectotype and the isotypes, and (2) the gathering was made in Cajamarca. Several lines of evidence support the first conclusion. The specimens are morphologically similar, and Bonpland's collection labels on the isotypes are virtually identical. The annotations on the isotype at P connect it with the lectotype, and the annotations on the isotype at B-W link it to that at P. In addition, the inclusion of *Anthericum peruvianum* as a synonym of *A. ciliatum* by Schultes and Schultes f. (1829) and as a synonym of *Phalangium ciliatum* by Kunth (1843) connects it with the lectotype.

Likewise, several lines of evidence are consistent with the conclusion that the Humboldt and Bonpland gathering was made in Cajamarca. First, the Humboldt and Bonpland specimens are similar morphologically to specimens collected in Cajamarca and distinct from material collected in Colombia and elsewhere in Peru. Second, Bonpland's collection labels on the putative isotypes indicate the specimens were collected in Peru, and Bonpland's labels are considered to be relatively accurate (see above). Third, Humboldt and Bonpland were in Cajamarca but did not visit the east side of the Andes where *Echeandia herrerae* and *E. weberbaueri* occur.

The use of "*ciliata*" to describe material from Colombia and Venezuela for nearly 200 years reflects three factors: (1) the repeated citation of Caracas as the type locality (e.g., Baker, 1876; Cruden, 1986a); (2) with the exception of a few traits, *Echeandia denticulata* and *E. ciliata* are remarkably similar, and without a clear alternative there was no reason to question the usage; (3) based on the material I examined, no collections of *E. ciliata* were made between 1802 and 1958. In essence, the alternative was unknown.

Additional specimens examined. PERU. **Cajamarca:** Cajabamba, near Cajabamba, *Sagástequi 15148* (F, MICH); Hualgayoc, Las Ventanillas–Frutillopampa, 10 km S of Bambamarca, *Sánchez Vega et al. 5687* (F); 5 km S of Cajamarca, rd. to the coast, *Sánchez Vega 3266* (F); rd. to Cumbé Mayo, W of Cajamarca, *Sánchez Vega et al. 1846* (F); Baños del Inca, above Pullucana, carr. Cajamarca–Celendín, *Sánchez Vega 4278* (F); 2 km from Baños del Inca on rd. from Cajamarca to Celendín, *Weigend et al. 97/427* (F); rd. to Celendín, Km 20, *Gutte & Müller 9375* (LZ); 43 km E of Cajamarca, 27 km N of San Marcos, *Dillon et al. 2862* (F, MO).

2. Echeandia denticulata Cruden, sp. nov. TYPE: Colombia. Cundinamarca: extreme SW corner of Sabana de Bogotá, betw. Sibaté & San Miguel, 2750 m, 15 Aug. 1939, *J. Cuatrecasas 6639* (holotype, COL!; isotypes, F!, US!). Figure 1.

Haec species *Echeandiae ciliatae* (Kunth) Cruden et *E. weberbaueri* (Poelln.) Cruden similis, sed ab eis filamentis manifeste squamosis et foliis basalibus integris usque denticulatis distincta; a *E. herrerae* (Killip) Cruden stylis longioribus et floribus cernuis usque patentibus differt; in Colombia et Venezuela indigena.

Storage areas of roots enlarged 0.5–1.5 cm from the rhizome, 1–4(–6) cm long. Basal leaves (3 to)4 to 14, (8–)10–42(–57) cm × (3–)4–10(–12) mm, straight and flat to falcate, entire to denticulate, rarely ciliate or long-ciliate, enations to 0.15(–0.26) mm; cauline leaves 0 to 2(or 3), if present, the lowest 1.3–3.4 (–5.1) cm. Scape 1(or 3), (10–)15–55(–85) cm high, glabrous throughout or occasionally glabrous apically and minutely scabrescent toward the base, 0 to 2(to 4) branches; main axis of inflorescence with (3 or)4 to 11(to 14) flower-bearing nodes, the lowest 2-flowered, occasionally 1-flowered in small plants or 3-flowered in large plants. Flowers yellow, most cernuous to patent; pedicels (4–)5.5–10(–11) mm; tepals 12.5–18(–20) mm, probably spreading to somewhat reflexed, inner 5–8 mm wide; filaments 5–7 mm, ± straight, bearing numerous, narrow, transverse scales; anthers free, (1.5–)2–3 mm, versatile, straight to weakly curved, dehiscence lateral; ovary (2.5–)3–4 (–5) mm; styles (5.5–)6–8.5(–9.5) mm, bent downward and then forward or weakly to strongly deflexed, rarely straight, arcuate, occasionally turned upward below the stigma, the stigmas exserted (1–)2–4(–5) mm beyond and below the level of the anthers. Capsules oblong, (9–)11–17 × 4.5–7 mm.

Distribution and habitat. This species is found primarily between 2300 and 3500 m, rarely to 3900 m, in the Cordillera Oriental in Colombia and Cordillera de Mérida in adjacent Venezuela (Fig. 1). Two collections made near Quetame, Colombia (*Pennell 1856* [NY, US] and *Lehmann 8842* [F, K]), are elevationally and somewhat geographically disjunct from the nearest populations of *Echeandia denticulata*. These were made between 1300 and 1800 m, a little southeast of the southeastern-most collection of *E. denticulata*, which was made south of Usme between 3000 and 3100 m. *Echeandia denticulata* is a plant of savannas and páramo, and occurs occasionally in pastures and cultivated fields.

Phenology. In flower (April to) mid-June to September (to mid-October).

Discussion. In addition to being geographically disjunct from its Peruvian relatives (Fig. 1), most specimens of *Echeandia denticulata* were easily identified by their scaled filaments and/or entire to denticulate leaf margins. The filaments of the specimens of *E. denticulata* with visible filaments (22 plants from nine populations) were scaled, and the leaf margins of most of the specimens were either entire (seven of 49 specimens), entire/denticulate (six specimens), or denticulate (26 specimens) and relatively few were either denticulate/short-ciliate (seven specimens) or short-ciliate (three specimens). In contrast, the filaments of most of the Peruvian specimens were either smooth (37 of 66 specimens) or wrinkled and scaleless (16 specimens), and relatively few specimens (13 of the 66) bore small, narrow, transverse scales. The leaf margins of most of the Peruvian plants were short-ciliate to long-ciliate (79 of 99 specimens) or denticulate/short-ciliate (18 specimens), and the leaf margins of just two specimens were denticulate. Also, compared to those of *E. denticulata*, the capsules of *E. ciliata* were smaller (10–12 mm vs. [9–]11–17 mm long) and the flowers of *E. herrerae* were erect rather than cernuous or patent, with tepals shorter (9–13[–15] mm vs. 12.5–18[–20] mm) and styles geniculate and shorter (2–6 [–6.5] mm vs. [5.5–]6–8.5[–9.5] mm). Further, the anthers of *E. denticulata* were versatile and somewhat shorter than those of *E. weberbaueri* ([1.5–]2–3 mm vs. [2–]2.5–4 mm long) and became twisted during or after dehiscence, whereas those of *E. weberbaueri* were nonversatile and usually remained straight after dehiscence.

Other traits differed qualitatively between *Echeandia denticulata* and its Peruvian relatives. The scapes of 56 of 63 specimens of *E. denticulata* were glabrous and seven were minutely scabrescent toward the base, whereas the scapes of most of the Peruvian plants were minutely scabrescent to scabrous (86 of 115 plants). Among specimens of *E. denticulata*, there was no relationship between tepal length and stamen length, but there were strong biases in the Peruvian species. The tepals of *E. denticulata* were more than twice the length of the stamens in nine plants, twice the length of the stamens in six plants, and less than twice the length of the stamens in seven plants. In contrast, the tepals of *E. ciliata* were usually more than twice the length of the stamens (12 of 17 specimens), and those of both *E. herrerae* and *E. weberbaueri* were usually less than twice the length of the stamens (40 of 41 plants from 18 populations and 11 of 14 flowers from seven plants, one population, respectively).

Etymology. The specific epithet describes the denticulate margins of the basal leaves, which help to differentiate this species from its Peruvian relatives.

Paratypes. COLOMBIA. *Moritz 1203* (BM). **Boyacá:** Sierra Nevada del Cocuy, near Laguna de San Pablin, *Grubb, Curry & Fernandez-Perez 117* (K), *Grubb, Curry & Fernandez-Perez 122* (K); W slope above Villa de Leyva, *Melampy 974* (MO). **Cundinamarca:** Bogotá, 1855, *Triana s.n.* (BM); S of Usme, betw. La Regadera & El Hato, Estación Agricola Exp. Usme, *Idrobo 410* (COL, US [2]); Mpio. de Mosquera, Zanjón–Las Cátedras, *Saravia 01031* (COL), *Saravia 01048* (COL); 30 km NW of Bogotá, Vereda de Rozo, 4 km S of Cota, *Fassett 25660* (NY, US); Guasca, *Arbelaez 1134* (COL, US); Ubaté, 100 km N of Bogotá, *Køie 4521* (C, US); "Terreros" [Bosa], *van der Hammen 469* (COL); S end of Suba Hill, near Bogotá, *Schiefer 881* (DS, GH). VENEZUELA. **Mérida:** betw. Apartaderos & Santo Domingo, *Lasser & Adams 4542* (VEN); betw. Santo Domingo & Chachopo, *Jahn 1122* (US); Mucurubá, *Gehriger 295* (F, MO, US [2]); near Mucurubá, Páramo del Chorro, Hacienda de Cacute, *Aristequieta 3284* (NY, VEN); Páramo de Mucubají, near Laguna Grande, *Schulz, Rodríguez & Sánchez 105* (U); head of Río Santo Domingo, Finca La Corcavada, *Schulz & Rodríguez 681* (U).

3. Echeandia herrerae (Killip) Cruden, comb. nov. Basionym: *Anthericum herrerae* Killip, J. Wash. Acad. Sci. 16: 566. 1926. TYPE: Peru. [Cuzco:] Paucartambo, Hacienda Churú, 3500 m, Jan. 1926, *F. L. Herrera 1012a* (holotype, US!). Figure 1.

Storage areas of roots enlarged 0.5–1.5 cm from the rhizome, 1.5–3 cm long. Basal leaves (4 to)6 to 12(to 14), 3–18(–22) cm × 3–10 mm, usually falcate, spreading, the margins densely short-ciliate to densely ciliate, or rarely densely denticulate or densely long-ciliate; cauline leaves 0 or 1, if present 6–37 mm long. Scapes 1 or 2(to 5), 3–26(–ca. 45) cm high, weakly to strongly scabrescent toward the base with well-developed enations, occasionally scabrous or scabrescent throughout, rarely glabrous or nearly so, height usually less than twice the length of the longest basal leaf, unbranched or rarely 1- or 2-branched; main axis of inflorescence with (2 or)3 to 11(to 13) flowering nodes, lowest nodes 1- or 2-flowered, upper 1-flowered. Flowers yellow, erect; pedicels 2.5–6(–7) mm; tepals 9–13(–15) mm, usually less, rarely more than twice the length of the stamens, probably spreading, inner 4–6 mm wide; filaments 4.5–6.5(–7) mm long, ± straight, inserted in a shallow pit, usually smooth or wrinkled and scaleless, occasionally bearing small, narrow, transverse scales; anthers free, 1–2(–2.5) mm, versatile, usually becoming curved or twisted during or after dehiscence, dehiscence lateral; ovary 2–4.5(–5) mm; style 2–6 (–6.5) mm, geniculate, the stigmas exserted to 2(–2.5) mm lateral to the stamens, rarely straight and the stigma equal to or barely exceeding the anthers. Capsules oblong to narrowly oblong, 7–15 × 4–6 mm.

Distribution and habitat. This species is widely distributed on the east side of the Andes in Peru from Junín south to Apurimac and Cuzco between 2800 and 3824 m (Fig. 1). It inhabits dry, rocky, or gravelly hillsides, pampas, fallow fields, pastures, and, occasionally, more mesic habitats.

Phenology. In flower December to April.

Discussion. Plants of *Echeandia herrerae* are distinguished by a number of floral and vegetative traits, which separate them from the other South American species of *Echeandia*. Most specimens were easily identified by their short (3–26[–ca. 45] cm high), scabrescent to scabrous scapes, which were usually one to two times the length of the longest basal leaf, and/or the densely short-ciliate to ciliate leaf margins (52 of 65 specimens from 27 collections). Occasional specimens had either long-ciliate (four specimens) or denticulate/short-ciliate (nine specimens) leaf margins. Flowering plants were easily identified by the erect flowers, short, geniculate, rarely straight styles, and short pedicels (2.5–6[–7] mm long). The latter were probably too short to accommodate the bending that occurred in the pedicels of the flowers of *E. ciliata* and *E. weberbaueri*, which have flowers that are cernuous or patent and pedicels that are (4–)5–14(–15) mm long.

The erect flowers and shorter (2–6[–6.5] mm vs. [5.5–]6–11 mm long), geniculate styles distinguished this species from the other South American *Echeandia*. Regardless of the inclination of their flowers, the styles of the other species were straight, arcuate or somewhat declinate, and exserted well beyond their anthers. Also, the scapes of *E. herrerae* were, in general, shorter than those of the other Peruvian species (3–26[–ca. 45] cm vs. [8–]15–62[–85] cm high), and those of half the specimens (42 of 80) were noticeably scabrescent to scabrous, whereas the scapes of *E. ciliata* and *E. weberbaueri* were either smooth or minutely to weakly scabrescent near the base. Because they are geographically sympatric, *E. herrerae* and *E. weberbaueri* might be confused. In addition to its geniculate styles, *E. herrerae* had shorter scapes (3–26[–ca. 45] cm vs. 34–59[–68] cm high) and shorter, versatile anthers (1–2[–2.5] mm vs. [2–]2.5–4 mm long) that twist during or after dehiscence rather than being nonversatile and remaining straight after dehiscence. Further, *E. herrerae* occurred at higher elevations (2800–3824 m vs. 2300–2700 m).

Etymology. The specific epithet honors Fortunato Lucian Herrera y Garmendia (1875–1945), well-known Peruvian botanist and professor of botany at the Universidad Nacional San Antonio Abad del Cuzco, who collected extensively in the region around Cuzco.

Additional specimens examined. PERU. Jan. 1864, *Pearce s.n.* (K). **Apurimac:** Quebrada, 2 km N of Andahuaylas, *Stork & Horton 10722* (F, G, K, MO, UC); Challhuanca, Aymaraes, *Núñez 7174* (MO); Abancay, Curahuasi, *Marin 1929* (F). **Cuzco:** Apurimac Valley, *Herrera 3067* (US); 13 km W of Cusco, *Ellenberg 1195* (U); Anta, Cillapuyu, El Chaccan, 28 Dec. 1972, *Brunel 204* (MO); Mar. 1973, *Brunel 621* (MO); Ancahuasi, NW Cusco, 40 km cerca Zurite, carr. a Cusco, *Núñez 7252* (MO); Calca, Huambutio, San Salvador, *Dueñas 152* (MO); Cuzco, *Herrera 2396* (F); Cuzco, *Soukup 893* (F); *Stafford 268* (K); Huasao, *Herrera 3108* (US); near Pisac, *Hunnewell 15905* (GH); Saqsayhuaman, *Gutte & Gutte 1916b* (LZ); Paucartambo, near Paucartambo, *Vargas 120* (F); Ccolcca, *Vargas 904* (F); Quispicanchis, Huaraipata, *Vargas 1788* (GH); Oropeza Valley, Hacienda Guispicanchi, *Herrera 2590* (US); Urubamba, Huayllamba, entre la quebrada Huayoccari, Lagunas de Yanacocha y Kellococha, *Tupayachi 900* (MO); Wachuna, rd. betw. Chinchero & Rajchi, *Davis et al. 1595* (F); rd. Chinchero to Urubamba, *Weigend & Weigend 2000/154* (MSB); Yanacona, near Perga Kachun, Q'allas, *Franquemont & Franquemont 257B* (F, MO); Valley of the Urubamba, Ollantaitambo, *Herrera 3457* (F, G). **Huancavelica:** Huancavelica, Larmes, E of Conaica, *Tovar 178* (MO, US). **Junín:** Jauja, Cerro Gloria Malca (serranias that surround Jauja), *Ochoa 275* (BH, US); Huancayo, *Soukup 3972* (COL, F, GH); Huancayo, Quebrada Occopilla, *Soukup 3641* (US); near Huancayo, *Killip & Smith 22027* (NY, US); Yauli, La Oroya, Pachacayo, *Gutte 2993b* (LZ); above the train station, *Gutte 9263a,b* (LZ).

4. **Echeandia lehmannii** (Baker) Marais & Reilly, Kew Bull. 32: 662. 1978. Basionym: *Anthericum lehmannii* Baker as "*lehmanni*," Bot. Jahrb. Syst. 8: 208. 1887. TYPE: Ecuador. Rare on alluvial [soil] near Malchinguí, S slope of [Volcán] Mojanda, 2800 m, 28 Jan. 1881, *F. C. Lehmann 429a* (holotype, BM!, fragm. K!; isotype, G!). Figure 1.

Echeandia aequatoris Ravenna, Phytologia 57: 327. 1985. Syn. nov. TYPE: Ecuador. Pichincha: via Mitad del Mundo–Calacalí, Hacienda Caspigasi, 7 Apr. 1979, *R. Jaramillo & D. Silva 933* (holotype, AAU not seen; isotype, QCA not seen).

Storage areas of roots enlarged 0.5–2 cm from rhizome, 1–2.5 cm long. Basal leaves 5 to 8, 8–20 cm × (3–)4–9[–10] mm, margins undulate, minutely denticulate to short ciliate; cauline leaves 1 to 3, lowest 1–6 cm long. Scape [19–]20–32(–40) cm high, glabrous or with a few small enations near the base, 0- to 2-branched; main axis of inflorescence with (5 to)9 to 16[or 17] flower-bearing nodes, lowest 2- or 3-flowered. Flowers yellow, nutant; tepals 10–15 mm, probably reflexed, inner to 5 mm wide; filaments narrowly clavate, bearing numerous small scales, [2.8–]5–6 mm; anthers connate, 4.5–5.5 mm, apex of cone deeply lobed, 0.8–1 mm across; ovary [2–]3–5 mm. Capsules oblong 8–13 × 4–4.5[–5] mm. (Measurements in brackets are from Ravenna's [1985: 327] description of *Echeandia aequatoris*.)

Distribution and habitat. Collection localities were provided for three of the four collections of this Ecuadorian endemic. Two of these were made 20–25 km north of Quito in or close to the Pululahua Geobotanical Reserve, and the third was made 25–30 km to the northeast of Quito near Malchinguí on the southern/southwestern slope of Volcán Mojanda–Fuya Fuya (Fig. 1). Elevations of 2800 and 2850 m were provided for two collections. The two areas are approximately 30 km apart. The plants were growing on alluvial soils (*Lehmann 429a*) and in open grassy areas (*Humbles 6283*).

Phenology. In flower late January to April.

Discussion. The combination of yellow flowers and connate anthers distinguishes *Echeandia lehmannii* from the other South American species.

There is no evidence that this species occurs other than in a small area north of Quito. The limited range and few collections suggest that *Echeandia lehmannii* is a narrow endemic and quite rare. The Lobb collection (*Lobb 33* [K]) is undoubtedly mislabeled, as numbers of his specimens from Peru and Ecuador were labeled "Columbia" (Killip, 1934).

Nomenclature. I have included *Echeandia aequatoris* as a synonym of *E. lehmannii* because there are no obvious and/or substantive differences between them. Ravenna's observation (1985: 327) that "the species [*aequatoris*] represents the first record of *Echeandia* from Ecuador" suggests that he was unaware of Marais and Reilly's (1978) transfer of Baker's species into *Echeandia*. Given the geographic proximity of the few populations, there is reason to question whether *E. aequatoris* represents a distinct species. A comparison of the protologue of *E. aequatoris* with the few available specimens of *E. lehmannii* revealed no substantive differences between the two. For most traits, the variation observed by Ravenna (1985) was included within the variation I observed, and the few exceptions provide minimal extensions of the ranges of those traits, e.g., leaf width from 3–9 to 3–10 mm (see above). The one exception might be filament length, but equivalent variation exists in other species (e.g., *E. leucantha*). Also, it seems quite unlikely that two morphologically similar, quite rare species would occur within a few kilometers of one another. Finally, the holotype of *E. aequatoris* was on loan and unavailable for study as of June 2001 and September 2004 (Nørgaard, pers. comm.; Balslev, pers. comm.). Renato Valencia Reyes confirmed the presence of the isotype at QCA.

Etymology. The specific epithet honors Friedrich Carl Lehmann (1850–1903), who collected widely in Latin America and made the first collection of this and other species now included in *Echeandia*.

Additional specimens examined. COLUMBIA [sic]. *Lobb 33* (K). ECUADOR. **Pichincha:** Pululahua Crater, ca. 22 km N of Quito, *Humbles 6283* (F, MO [2]).

5. **Echeandia weberbaueri** (Poelln.) Cruden, comb. nov. Basionym: *Anthericum weberbaueri* Poelln., Revista Sudamer. Bot. 7: 103. 1942. TYPE: Peru. Huancavelica: Tayacaja, valley of the Mantaro River below Surcubamba, 2300–2400 m, 14 Mar. 1913, *A. Weberbauer 6481* (holotype, B! [image examined online]; isotypes, DS!, F!, GH! [2], NY!, US! [2]). Figure 1.

Storage areas of roots enlarged 0.5–1.5 cm from the rhizome, 1.5–3 cm long. Basal leaves 7 to 12(to 16), (6.5–)10–25(–33) cm × (3–)6–12 mm, flat, occasionally falcate, margins ciliate to long-ciliate (*Weberbauer 6481*) or denticulate to short-ciliate (*Tovar 4001*); cauline leaves 0 to 2, if present, the lowest 16–35(–49) mm. Scape 1(to 3), 34–59(–68) cm high, frequently (8 of 12 plants) more than twice the length of the longest basal leaf, smooth or nearly so, occasionally minutely scabrescent toward the base, sometimes with 1(or 2) few-flowered branches; main axis of inflorescence with (4 to)7 to 15 flower-bearing nodes, lowest nodes 1-, 2(or 3)-flowered, upper 1- or 2-flowered. Flowers yellow, cernuous to patent; pedicels 6–14(–15) mm; tepals 11–16.5(–18.5) mm, usually less than twice the length of the stamens, probably spreading to somewhat reflexed, the inner tepals 5–8 mm wide; filaments 6–7 mm, ± straight, smooth, occasionally wrinkled and scaleless or bearing tiny, narrow, transverse scales; anthers free, (2–)2.5–4 mm, straight to reniform, non-versatile, the anther walls strongly reflexed holding the anther on the same axis as the filament (cf. *Weberbauer 6481* [GH, NY, US]), rarely versatile or apparently so, occasionally twisted or strongly curved, dehiscence lateral; ovary 2–3(–3.5) mm; styles 7–11 mm, straight to gently deflexed (to 30°), turned upward below the stigma, the stigma exserted (2–)3–5(–6) mm beyond the anthers. Capsules narrowly oblong, 12–13.5 × 4.5–5.5 mm.

Distribution and habitat. This Peruvian species is known from two collections made 5–10 km from one another in or near the valley of the Río Mantaro in Huancavelica, ca. 60 km east of Huancayo (Fig. 1), between 2300 and 2700 m. The available data suggest it is a species of open hillsides and cultivated land.

Phenology. In flower February to April.

Discussion. Plants of *Echeandia weberbaueri* were distinguished by their tall scapes (34–59[–68] cm high), flat, relatively broad ([3–]6–12 mm wide) basal leaves, some of which had long-ciliate margins (*Weberbauer 6481*) and long ([2–]2.5–4 mm), straight, nonversatile anthers, whose strongly reflexed walls held the anthers on the same axes as their filaments.

The wide, flat basal leaves and long, nonversatile anthers of *Echeandia weberbaueri* helped to distinguish it from *E. denticulata* and the other Peruvian species. The anthers usually remained straight rather than twisting during or after dehiscence and were longer than the versatile anthers of the other Peruvian species ([2–]2.5–4 mm vs. 1–2.5 mm long), whose anthers usually became twisted during or after dehiscence. Compared to *E. denticulata*, the filaments of *E. weberbaueri* were mostly smooth and/or scaleless (13 of 14 plants) and those of one plant bore small, narrow, transverse scales, whereas the filaments of *E. denticulata* were noticeably scaled. Compared to *E. ciliata*, the basal leaves of *E. weberbaueri* were, in general, flat and wider than the falcate basal leaves of

E. ciliata ([3–]6–12 mm vs. [1–]2–7[–9] mm wide). The tepals of *E. weberbaueri* were generally less than twice the length of the stamens (12 of 15 plants), whereas those of most specimens of *E. ciliata* were twice or more than twice the length of the stamens (13 of 15 plants). Also, the scapes of most plants of *E. ciliata* were three to four times the length of the longest basal leaf, whereas those of *E. weberbaueri* were mostly less than twice the length of the longest basal leaf. Specimens of *E. weberbaueri* were easily distinguished from those of *E. herrerae*, with which it is geographically sympatric (Fig. 1). The scapes of *E. herrerae* were shorter (3–26[–ca. 45] cm vs. 34–59 [–68] cm high), frequently scabrescent to scabrous, the anthers shorter (1–2[–2.5] mm vs. [2–]2.5–4 mm), the styles shorter (2–6[–6.5] mm vs. 7–11 mm) and geniculate, and it occurred at higher elevations (2800–3824 m vs. 2300–2700 m).

Etymology. The specific epithet honors August Weberbauer (1871–1948), German-educated botanist and professor of botany at the Universidad Nacional Mayor de San Marcos in Lima, Peru, who made the first collection of this species.

Additional specimen examined. PERU. **Huancavelica:** Tayacaja, near Huachocolpa, *Tovar 4001* (US).

Ib. Subgenus Mscavea Cruden, Novon 9: 326. 1999. TYPE: *Echeandia mcvaughii* Cruden, Contr. Univ. Michigan Herb. 16: 129. 1987.

Flowers white, occasionally cream-colored, yellow, or orange; inner tepals narrowly elliptic; flowers opening in late morning or early afternoon and closing near dusk (see Cruden, 1999). The subgeneric epithet honors Marion Stilwell Cave (1904–1995), distinguished embryologist and student of the Liliaceae s.l. (see Constance et al., 1996).

6. Echeandia bolivarensis Cruden, Ann. Missouri Bot. Gard. 76: 350. 1989. TYPE: Venezuela. Bolívar: Igneous forested slopes, Serranía de Pijiguaos, 160 km SW of Caicara del Orinoco, 6°35′N, 66°45′W, 100–125 m, 12 Sep. 1985, *J. Steyermark, B. Holst & B. Manara 131761* (holotype [2 sheets], MO3472626!, MO3472627!; isotype, UC!). Figure 1.

Storage areas of roots enlarged (1–)3–6 cm from the rhizome, 3–5(–6) cm long. Basal leaves 6 to 10, ascending, narrowly lanceolate above the base, minutely denticulate-serrulate, mostly 45–60 cm × 11–18 mm; cauline leaves 4 or 5, the lowest 10–19 cm, long attenuate. Scape glabrous, 98–118 cm high, 1- to 5-branched; main axis of inflorescence with 9 to 14 flower-bearing nodes, the lower 4-flowered, the upper 2- or 3-flowered. Flowers yellow; tepals 10–11 mm, inner ca. 3.5 mm wide; filaments linear, 6.5 mm long, sparsely to noticeably scaled with tiny to small scales, inserted ± basally in a deep pit; anthers free, 2.4–4 mm, somewhat flared basally, nonversatile, dehiscence apical; ovary 2–2.5 mm; style 7–8.5 mm. Capsule broadly oblong, 10–11 × 6.5–7.5 mm. Seeds 2.5–3 mm across.

Distribution and habitat. This Venezuelan endemic is known from just two collections made between 100 and 600 m in the Serranía de Pijiguaos at 6°35′N, 66°45′W and 6°34′N, 66°47′W, respectively, a little west and southwest of Los Pijiguaos (6°35′N, 66°44′W) in western Bolívar (Fig. 1). The type gathering was made on an open rock face in the forest, and *Gröger & Berg* (*1064*) reported it growing in cushions of *Selaginella* P. Beauv. among *Vellozia tubiflora* (A. Rich.) Kunth.

Phenology. In flower late July to September.

Discussion. This species is easily distinguished from other South American *Echeandia* by the combination of yellow flowers, relatively short tepals (10–11 mm long), free, nonversatile anthers, tall (98–118 cm) scapes, and roots with long (4–5 cm) storage areas that are enlarged 4–5 cm from the rhizome.

I have included this species in *Echeandia* subg. *Mscavea* with some hesitation because the plants are yellow-flowered, which is rare in the subgenus (Cruden, 1999). However, a number of other traits are consistent with this disposition. The insertion of the filaments is basal, or essentially so, in a deep pit. Basal insertion is uncommon in subgenus *Mscavea* (six of the other 25 species) but rare in subgenus *Echeandia* (one of 55 species). Second, the distance from the opening of the pit to the base of the anther sac is less than 0.25 mm, which is common in subgenus *Mscavea* (12 of 20 species examined) and rare in subgenus *Echeandia* (one of 19 species examined). Third, the anthers dehisce apically, as do the anthers of the other four species in subgenus *Mscavea* with free anthers, whereas in subgenus *Echeandia*, apical dehiscence occurs in only four of the 32 species with free anthers. Also, the inner tepals are ca. 3.5 mm wide and the capsules are broadly oblong, which are typical of species in subgenus *Mscavea* but uncommon or rare in subgenus *Echeandia*. Finally, *E. bolivarensis* occurs below 800 m, as do eight of the other 25 species in subgenus *Mscavea*, whereas only six of 53 species in subgenus *Echeandia* occur below 800 m and two of these occur in northeastern Mexico and/or the adjacent United States, which has a temperate climate.

Etymology. This species was named for the state in which the plants were collected.

Additional specimen examined. VENEZUELA. **Bolívar:** Los Pijiguaos, NE Campamento de Bauxiven, summit Cerro La Guacamaya, *Gröger & Berg 1064* (MO).

7. Echeandia leucantha Klotzsch, Allg. Gartenzeitung (Otto & Dietrich) 8: 275. 1840. TYPE: Venezuela. prope coloniam Tovar, 3500 ft., 1854–1855, *A. Fendler 1549* (neotype, designated here, GH!; isotype, K!). Figure 1.

Echeandia prolixa Woodson, Ann. Missouri Bot. Gard. 29: 325. 1942. TYPE: Panama. Panamá: Vic. of Bejuco, 7 Sep. 1942, *P. H. Allen 2962* (holotype, MO! [2]; isotype, GH!).

Storage areas of roots 2–3.5 cm, enlarged 3–6 cm from the rhizome. Basal leaves 7 to 12, (15–)27–83 cm × 6–20(–25) mm, narrowly lanceolate to broadly elliptical, frequently falcate, serrulate to short-ciliate; cauline leaves 1 to 6(or 8), lowest 2.5–17 cm. Scape (40–)65–112 cm high, glabrous, 0- to 4(or 5)-branched; main axis of inflorescence with 7 to 15(or 17) flower-bearing nodes, the lowest 2- to 4-flowered, upper 1- to 3-flowered. Flowers white, nutant; tepals 8.5–12 mm, usually reflexed; filaments scaled, linear, (2.5–)4–5 mm; anthers connate, (3.5–)4–6(–7) mm long, cone more than 1.6 mm wide, 0.8–1.2 mm wide at the apex; ovary 1.5–2.2 mm. Capsules broadly oblong, 7–9 × 4.5–5.5 mm, rarely globose, ca. 5 × 5 mm.

Distribution and habitat. This species occurs from northwestern Venezuela and adjacent Colombia (Fig. 1) north to Honduras. It inhabits savanna, woods, pastures, and roadsides usually below 1200, rarely to 1500 m.

Phenology. In flower mid-June to early September, also collected in flower 21 January 1982 (*Aymard & Ortega 821*).

Discussion. *Echeandia leucantha* is one of the two South American species in subgenus *Mscavea* that also occurs in Central America. The South American populations were white-flowered, but those in Honduras and some in Nicaragua were yellow- or orange-flowered. Specimens from South America were easily identified by the combination of white flowers, connate anthers, scaled filaments, and storage areas of the roots that develop 3–6 cm from the rhizome. The scaled filaments and storage areas that develop away from the rhizome distinguish it from *E. pittieri*, which has smooth filaments and storage areas that develop 1–2 cm from the rhizome. The Purdie (*s.n.*) collection from Colombia lacks open flowers and is included here with reservation.

Nomenclature. The Fendler specimen was selected to be the neotype because it is a complete specimen that includes roots with storage areas, flowers (in the packet), and capsules. The collection was made less than 50 km from Maracay, i.e., the locality cited by Klotzsch (1840).

The designation of a neotype was necessary because no specimen was cited by either Klotzsch (1840) in his protologue or Otto (1840) in his Nachtrag to the protologue; the protologue was not accompanied by an illustration; and a putative type specimen was not found among the specimens examined. Klotzsch's (1840) description was based on plants growing in the Botanical Garden in Berlin from material collected by Moritz in 1836 near Maracay, Venezuela. The most likely places to find Moritz's specimen, if one were made, are B, BM, HAC, or possibly W (Stafleu & Cowan, 1981: 588). Such a specimen was not found at B (C. Oberprieler, pers. comm.; T. Raus, pers. comm.), BM (R. Vickery, pers. comm.), K (P. Wilken, pers. comm.), or W (B. Wallnöfer, pers. comm.), and I received no reply to enquiries sent to HAC.

At the time *Echeandia leucantha* was described, Otto was the gardener at B and it is possible that he made a collection of this species. If he did, it is missing at B (T. Raus, pers. comm.; C. Oberprieler, pers. comm.), and no specimen was found at GOET (J. Heinrichs, pers. comm.). The latter institution was suggested as a source for Otto's duplicates (Stafleu & Cowan, 1981: 858). Some of Moritz's Venezuelan material went to W, but any such specimens were destroyed during World War II (B. Wallnöfer, pers. comm.).

Etymology. The specific epithet describes the white flowers, which are typical of species in subgenus *Mscavea*.

Additional specimens examined. COLOMBIA. **Magdalena:** Santa Marta, *Purdie s.n.* (K); ridge E of Manaure, *Haught 4342* (NY, UC, US). VENEZUELA. 1846, *Funcke & Schlim 674* (BM, BR, G). **Carabobo:** near Valencia, *Pittier 8900* (US); Hacienda de Cura, near San Joaquín, *Pittier 7996* (US); Maracay, 1928, *Vogel 10* (SMU). **Portuguesa:** 5 km ENE of Agua Blanca, 22 km NE of Acarigua, *Steyermark & Rabe 96473* (US, VEN); Guanare, terrenos de la UNELLEZ, *Stergios & Ortega 1983* (NY, VEN), *Stergios & Aymard 5601* (MO), *Aymard & Ortega 821* (MO); Acarigua, *Burkart 17116* (VEN). **Zulia:** Perijá, *Gines 1857* (US); Kunaria, *Gines 1948* (F).

8. Echeandia pittieri Cruden, Phytologia 59: 379. 1986. TYPE: Panama. Chiriquí: 5 mi. S of Boquete toward David, in savanna near rocky creek, 2800 ft., 26 Aug. 1965, *S. McDaniel 6810* (holotype, MO!; isotype, DUKE!).

Storage areas of roots 1–1.5 cm, enlarged 1–2 cm from the rhizome. Basal leaves 5 to 11, (18–)29–41 cm × (4–)11–20 mm, narrowly lanceolate, entire or short-ciliate; cauline leaves 3 to 5, the lowest 5–20.5 cm. Scape 80–115 cm high, glabrous, 0- to 2-branched; main axis of inflorescence with 9 to 15 flower-bearing nodes. Flowers white, nutant; tepals 10–12.5 mm, reflexed; filaments smooth, linear, 3–4.5 mm; anthers connate, 5.5–7 mm; ovary 2–3 mm. Capsules broadly oblong, 6.5–7.5 × ca. 5 mm.

Distribution and habitat. This species is known from two localities in Panama (Cruden, 1986b) and one in Colombia (Fig. 1). The two collections from Panama were made at ca. 850 and 1000 m and that from Colombia at 1200 m. One collection from Panama was made in a savanna near a creek, and in Colombia, the specimens were collected on a loma where it grew with shrubs. A collection from northern Colombia (*Haught 4342*) previously included in this species (Cruden, 1986b) is properly placed in *Echeandia leucantha*.

Phenology. In flower late July to August.

Discussion. This species is characterized by its white flowers, connate anthers, smooth filaments, and storage areas of the roots that develop 1–2 cm from the scape. The smooth anthers and storage areas that develop close to the rhizome distinguish *Echeandia pittieri* from *E. leucantha*, which has scaled filaments and longer storage areas (2–3.5 cm vs. 1–1.5 cm long) that develop 3–6 cm from the rhizome.

Etymology. The specific epithet honors Henri François Pittier (1857–1950), a Swiss botantist who collected widely in Colombia, Venezuela, and Central America.

Additional specimens examined. COLOMBIA. **Valle del Cauca:** W slopes of Cordillera Occidental, valley of the Río Sanjuniquín, Naranjal, *Cuatrecasas 15356* (F, US).

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APPENDIX 1. List of accepted species in *Echeandia* (in boldface) and associated names (in italics) listed by genus and subgenus.

Anthericum L.
A. ciliatum (Kunth) Spreng., nom. illeg. – **E. ciliata**
A. glareosum Ravenna – **E. ciliata**
A. herrerae Killip – **E. herrerae**
A. humboldtii Hemsley – **E. ciliata**
A. lehmannii Baker – **E. lehmannii**
A. weberbaueri Poelln. – **E. weberbaueri**

I. Echeandia Ortega
Ia. Echeandia subgenus **Echeandia**
E. aequatoris Ravenna – **E. lehmannii**
1. **E. ciliata** (Kunth) Cruden
2. **E. denticulata** Cruden
3. **E. herrerae** (Killip) Cruden
4. **E. lehmannii** (Baker) Marais & Reilly
5. **E. weberbaueri** (Poelln.) Cruden
Ib. Echeandia subgenus **Mscavea** Cruden
6. **E. bolivarensis** Cruden
7. **E. leucantha** Klotzsch
8. **E. pittieri** Cruden
Phalangium P. Miller
P. ciliatum Kunth – **E. ciliata**

APPENDIX 2. Index to exsiccatae. Holotypes, lectotypes, and neotypes are in boldface. The parentheses enclose the number of the species as it appears in the text (see Appendix 1).

Allen 2962 (7); *Arbelaez 1134* (2); *Aristequieta 3284* (2); *Aymard & Ortega 821* (7). *Brunel 204* (3), *621* (3); *Burkart 17116* (7). ***Cuatrecasas 6639*** (2); *15356* (8). *Davis et al. 1595* (3); *Dillon, Molau & Matekaitis 2862* (1). *Ellenberg 1195* (3). *Fassett 25660* (2); ***Fendler 1549*** (7); *Franquemont & Franquemont 257B* (3); *Funcke & Schlim 674* (7). *Gehriger 295* (2); *Gines 1857* (7); *1948* (7); *Gröger & Berg 1064* (6); *Grubb, Curry & Fernandez-Perez 117* (2), *122* (2); *Gutte 9263a,b* (3), *2993b* (3); *Gutte & Gutte 1916b* (3); *Gutte & Müller 9375* (1). *Haught 4342* (7); ***Herrera 1012a*** (3), *2396* (3), *2590* (3), *3067* (3), *3108* (3), *3457* (3); *Humbles 6283* (4); ***Humboldt & Bonpland s.n.*** (1); *Hunnewell 15905* (3). *Idrobo, Jaramillo, Mesa-Bernal & Smith 410* (2). *Jahn 1122* (2). *Killip & Smith 22027* (3); *Køie 4521* (2). *Lasser & Adams 4542* (2); ***Lehmann 429a*** (4), *8842* (2); *Lobb 33* (4); ***López 1307*** (1). *Marin 1929* (3); ***McDaniel 6810*** (8); *Melampy 974* (2); *Moritz 1203* (2). *Núñez 7174* (3), *7252* (3). *Ochoa 275* (3). *Pennell 1856* (2); *Pittier 7996* (7), *8900* (7); *Purdie s.n.* (7). *Sagástegui 15148* (1); *Sánchez Vega 3266* (1), *4278* (1); *Sánchez Vega, Flores & Levia 5687* (1); *Sánchez Vega, Ruiz Vigo & Sánchez Vega 1846* (1); *Saravia 01031* (2), *01048* (2); *Schiefer 881* (2); *Schulz & Rodríguez 681* (2); *Schulz, Rodríguez & Sánchez 105* (2); *Soukup 893* (3), *3641* (3), *3972* (3); *Stafford 268* (3); *Stergios & Aymard 5601* (7); *Stergios & Ortega 1983* (7); *Steyermark & Rabe 96473* (7); ***Steyermark, Holst & Manara 131761*** (6); *Stork & Horton 10722* (3). *Tovar 178* (3), *4001* (5); *Tracey 301* (2); *Triana s.n.* (2); *Tupayachi 900* (3). *van der Hammen 469* (2); *Vargas 120* (3), *904* (3), *1788* (3); *Vogel 10* (7). ***Weberbauer 6481*** (5); *Weigend & Weigend 2000/154* (3); *Weigend, Dostert & Drießle 97/427* (1).